

DESIGN AND CONSTRUCTION GUIDELINES AND STANDARDS

DIVISION 32 • EXTERIOR IMPROVEMENTS

32 30 00 • SITE IMPROVEMENTS

SECTION INCLUDES

Site Improvements
Chain Link Fence
Wood Fence
Metal Fence
Fencing Other
Railings
Retaining Walls
Seating
Signage
Lighting
Traffic Control Devices
Security
Trash Management
Drying Yards
Recreational Facilities
Playground Equipment

RELATED SECTIONS

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22 00 00 Plumbing
26 00 00 Electrical
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32 80 00 Irrigation
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FENCING

DESIGN

Provide concrete footings to frost depth for chain link and wrought iron fencing. Top of footing must be tooled so as to slope away from fence post. Flange mounted posts anchored to the footings are preferred to sleeve mountings. Where used, sleeve mountings should be filled with non-shrink grout and tooled in a weathered joint at the post to shed water. Do not set metal posts directly into the footings. Wood posts should be anchored in concrete footings with strap anchors, but may also be directly buried on a crushed stone footing or encased in a concrete collar with the end of the post in 4 to 6 inches of gravel below to allow moisture to drain and avoid rot.

Set height of fence appropriate to its function on the site. Barrier fences should not exceed 6ft, privacy fences 4ft, and delineation fences 30in.

Standard 2in diamond mesh is acceptable for most chain link fence uses. Close weave (1in) mesh may be used for more decorative applications.

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FENCING, CON'T

Spacing of fence pickets must follow the opening limitations specified in the most current edition of the Mass. State Building Code.

Provide a top and bottom rail.

Chain link mesh selva edges must be knuckled into top and bottom rails. Exposed selva edges are not acceptable. Pickets may not project above the top rail of the fence.

Do not use plastic inserts in chain link fencing.

MATERIALS

Chain link should have a fused vinyl coating for durability and appearance. Specify a minimum 9 gauge mesh fabric exclusive of coating. Specify matching vinyl coated or color galvanized posts and rails and precise minimum size and weight.

Metal picket fences must be steel or wrought iron. Aluminum fences are not acceptable. Pickets should be welded to top and bottom rail; sections should be mechanically fastened to posts using tamper-proof fasteners.

Wood fences must be sealed or stained. Wood composites are acceptable. Posts must be pressure-treated or cedar. Metal fittings and fasteners must be galvanized or stainless steel.

PVC fence systems are an acceptable substitute for wood in limited applications. Avoid in situations subject to high impact.

RAILINGS

DESIGN

Flange mounted railing supports anchored into concrete are preferred to sleeve mountings. Where used, sleeve mountings should be filled with non-shrink grout and tooled in a weathered joint at the support to shed water. Do not set metal supports directly into the footings.

New railings need to meet current code and MAAB/UFAS design standards..

MATERIALS

Use Schedule 40 galvanized steel pipe, 1 1/4in min diameter for rails and supports. Guard rail pickets to be Schedule 40 galvanized steel pipe, 5/8in diameter.

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RETAINING WALLS

DESIGN

Retaining walls must be designed to withstand earth load and hydrostatic pressure to insure a long lasting installation. Depending on the installation, they may be either of flexible (unit assemblies requiring no frost footings) or rigid (monolithic structures carried to frost depth) construction. Design must be stamped by a Massachusetts registered Civil Engineer.

Check code requirements for railings if wall exceeds 4" in height above mean grade.

Flexible retaining wall construction should not exceed 8ft in height (subject to manufacturer's recommendations).

Face of rigid walls may be vertical or slightly battered. Flexible walls should be battered to a vertical slope of 1:6.

Provide drainage swale or impervious gutter at the foot of all slopes above surcharged walls to direct runoff away from the top of the wall.

Submit engineering calculations for all retaining walls during design.

Provide expansion joints no farther than 30ft apart in rigid construction.

Provide 12in min drainage layer of crushed stone backfill behind rigid walls only for the grade-to-grade height of the wall with continuous perforated PVC underdrain or weepholes at 6ft on center. Seal top of drainage layer with 4in layer of clay and 6in of topsoil. For flexible walls, provide 18in min drainage layer for the full height of the wall with the underdrain at the lowest point of the drainage layer. Connect underdrains to the local storm drainage system or to a suitable outfall.

MATERIALS

Acceptable materials include:

- ☐ reinforced concrete (4000 psi recommended)
- ☐ interlocking precast units
- ☐ galvanized wire mesh basket systems
- ☐ on-site field stone for riprap or walls

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SEATING

DESIGN

- ☐ Location criteria:
 - ☐ Convenience and views
 - ☐ Sheltered from wind and sun and also unsheltered
 - ☐ Set back from circulation paths
 - ☐ Coordinate with landscaping
 - ☐ Accessible for the disabled
- ☐ Settings:
 - ☐ Formal groupings
 - ☐ Informal conversation areas
 - ☐ Single benches
 - ☐ Steps, stoops, seat walls

Seating should be anchored to or integral with foundations extending to frost depth.

Bench design should incorporate arm rests, back supports and sufficient heel space to facilitate use by individuals with limited strength.

Seat surface should be above grade and pitched slightly to shed water.

Benches should be placed on paved bases

Seating design should discourage undesirable uses. Provide arm rests at intervals to deter napping.

Structures intended to serve as seating should allow a seat width of 15in to 18in.

MATERIALS

Benches: Metal frame and slats preferred. Avoid wood slats and contoured plastic. Finishes should be graffiti and weather resistant.

Avoid mesh. Wood composites are acceptable.

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SIGNAGE

DESIGN

Signage is required for traffic control, direction finding and identification. Information should be displayed for quick, easy and understandable viewing by either motorists or pedestrians. Simplicity, clarity and visibility are the three criteria for design.

Consult local public safety authorities for any specific local requirements relating to size, location and display of building address numbers.

Traffic control signage and pavement markings shall conform to the official standards of the Federal Highway Administration, U.S. Department of Transportation, as described in the most recent edition of the Manual on Uniform Traffic Control Devices (MUTCD).

<http://mutcd.fhwa.dot.gov>

Signage required for handicap accessibility under 521 CMR23.6 shall conform to the Massachusetts Office of Disabilities (MOD) publication "Handicapped Parking Regulations" and Chapter 4.30 of the Uniform Federal Accessibility Standards (UFAS).

www.mass.gov/mod/HPParkingRegs.html

MATERIALS

Metal signs shall be 18ga galvanized reflective steel with a graffiti resistant finish.

Signposts may be galvanized U-channel or galvanized square tube for adjustable height signs, or galvanized Schedule 40 tubular steel for fixed height signs.

Wood signposts are not allowed for traffic control signs, but may be used for directional or informational signage at the discretion of the designer.

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SITE LIGHTING

INVESTIGATION

Effective site lighting facilitates the safe movement of pedestrians and vehicles, assists in creating a secure environment and minimizes the risk of property damage and personal injury after dark.

The designer should thoroughly analyze the lighting requirements of the site before developing a lighting plan. This should address security as well as visibility and environmental concerns. The local electrical power provider should also be engaged in the investigative phase to determine if any rate savings programs apply.

Site lighting design submissions must include product cuts with photometric charts for each type of light fixture proposed plus a photometric plan.

DESIGN

The following are considered acceptable minimal levels of illumination in footcandles:

<input type="checkbox"/> Active building entries:	5.0
<input type="checkbox"/> Inactive entries:	1.0
<input type="checkbox"/> Roadways:	0.4
<input type="checkbox"/> Walkways along roadside:	0.9
<input type="checkbox"/> Residential walkways:	0.5
<input type="checkbox"/> Parking areas:	1.0
<input type="checkbox"/> Playgrounds:	5.0
<input type="checkbox"/> Basketball courts:	10.0

Maintain low uniformity ratios [avg illumination (fc) / min illumination (fc)] to ensure a consistent level of illumination and avoid “hot spots”.

Locate light fixtures at regular intervals to reinforce circulation paths with a clearly defined lighting pattern.

Avoid the re-use of existing fixtures.

Mounting heights should be between 10-15ft (walkway and pedestrian lighting), 20-30ft (parking lot) and 20-50ft (roadway). Pedestrian and parking lot lighting may be either building or pole mounted. Walkway and roadway lighting should be pole mounted to maintain a uniform and consistent level of illumination.

Vertical light spreads of walkway fixtures should overlap at a height of 7ft above the walkway surface to enable visual recognition.

Avoid shadows, glare and light pollution by proper placement, shading and shielding of light fixtures.

Avoid low-height lighting in family developments

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SITE LIGHTING, CON'T

Coordinate lighting design with site security requirements. Direct light away from points of surveillance. Highlight building entrances. Illuminate vertical surfaces to generate silhouettes.

MATERIALS

Luminaires shall be high intensity discharge (HID) fixtures. High Pressure Sodium (HPS) lamps are preferred.

All luminaires are to be of the high angle cutoff type to minimize light pollution.

Building mounted luminaires should be accessible for easy lamp changing and maintenance.

TRAFFIC CONTROL

DESIGN

☐ Fixed Pipe Bollards:

- ☐ Set in concrete footings to frost depth, with 3ft min bury.
- ☐ Fill with concrete and provide a reinforcement cage in the footing around the pipe when used for parking and vehicular control.
- ☐ Provide a 4in min white reflective band 6in from top where required for visibility.
- ☐ Crown bollard with 1inch of concrete to shed moisture.
- ☐ Parking bollards should be tall enough to be seen from a backing vehicle.
- ☐ Avoid linking bollards with chains.

☐ Removable Pipe Bollards:

- ☐ Set in sleeved concrete footings to frost depth.
- ☐ Provide locking mechanism and lifting handles.
- ☐ Coordinate placement with site requirements for emergency and public safety access.

☐ Guard Rails:

- ☐ Use only when necessary to protect vehicles from going down hill

☐ Wheel Stops:

- ☐ These may be used in the absence of curbs at the head of parking stalls, but may impede snow removal.
- ☐ Avoid unless requested by the Housing Authority.
- ☐ Anchor with 12 inch long rebar 2 ft 6 in min from head of stall.

☐ Traffic Islands

- ☐ Avoid where possible, When used minimum dimension should be 22 ft and sloped granite curbing provided.

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TRAFFIC CONTROL, CON'T

- ☐ **Medians**
 - Avoid where possible, When used provide sloped granite curbing around the entire median.
 - Do not landscape or seen medians under 5 ft in width. Instead pave with cobbles, Belgian block or some other similar paving material.
 - Decorative fencing and lighting along the centerline may be added where appropriate.
 - Consult local planning and zoning regulations for required approvals or design guidelines.
- ☐ **Speed Bumps are Not Acceptable !**
- ☐ **Security Gates:**
 - Specify only as part of a comprehensive site security and access/circulation control plan developed with local police and fire department approval.
 - Gate booms and stanchions must have 12in wide bands of reflective tape applied 18in on center over their entire length.
 - Provide locking mechanisms at both open and closed positions of the gate. Provide a lock box for each gate.

MATERIALS

- ☐ **Fixed Bollards:**
 - Concrete filled Schedule 80 galvanized or painted steel heavy wall pipe.
 - Bury 3ft min in 4000 psi concrete footing.
- ☐ **Removable Metal Bollards:**
 - Schedule 80 steel pipe with formed steel cap inserted in Schedule 40 flanged metal sleeve set in 4000 psi concrete footing.
- ☐ **Wheel Stops:**
 - Precast concrete, 6 in high by 8 ft long with two galvanized steel anchor rods per stop.
 - Plastic Wheel stops are acceptable.
- ☐ **Security Gates:**
 - Gate booms, stanchions and pivot posts to be galvanized (shop painted) steel pipe. Footings are to be cast-in-place concrete, 6ft min deep.
 - Bury pivot post 3ft min into footing.

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SECURITY

INVESTIGATION

LHAs should thoroughly investigate and analyze their own particular security requirements. If necessary, a comprehensive security master plan should be developed with the assistance of security specialists and the cooperation of local law enforcement agencies. Case studies of successful security plans implemented by other LHAs should be central to the preparation of the master plan.

LHAs should be prepared to devote the necessary resources to maintain sufficient staffing and enforcement means to support the implementation of the master plan.

Refer to CPTED (Crime Prevention Through Environmental Design) design strategies in preparing the security master plan.

www.cpted.net/home.html

DESIGN

Identify and illuminate all building entrances.

Maintain proper illumination levels and placement of site lighting.

Provide identification for the addresses of buildings and units that is clearly visible from the street or parking lot.

Keep parking areas visible from units where possible.

Use landscaping to highlight building entrances and screen private areas. Avoid opportunities for concealment.

Utilize site security cameras only in conjunction with established LHA security protocols and in consultation with a security design specialist.

MATERIALS

Lettering for building identification should be of non-reflective material and no less than 5in high.

Site security cameras may be a combination of fixed and PTZ (pan-tilt-zoom) and may be mounted on security camera poles, utility poles or building walls. Mounting height should be no less than 16ft above grade.

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TRASH MANAGEMENT

INVESTIGATION

Coordinate design and location of trash collection areas and receptacles with LHA trash collection operations. Development of a comprehensive waste collecting plan may be necessary.

Determine whether waste collecting vehicles (WCVs) are front loading or rear loading. Most large housing developments utilize dumpsters that are emptied by front loading WCVs. Developments not serviced by dumpsters usually rely on individual pickups by rear loading WCVs.

Review the routes through and points of access into the site used by WCVs. These may have to be altered to support a more efficient or less disruptive waste collection process.

Incorporate locally mandated recycling policies into the waste collecting plan. Provide separate collection areas for recyclable goods containers and review access and loading requirements for recycling WCVs.

DESIGN

- ☐ Locate dumpsters and outside trash container storage areas where they will be accessible to WCVs with a minimum of turning and maneuvering. Locations should also be convenient to residents, who should not have to travel more than 100ft (elderly units) or 200ft (family units) from their door.
- ☐ Dumpster enclosures should be of block wall construction with protective bollards within the enclosure to prevent the dumpster from damaging the block wall. The enclosure should have no gates
- ☐ Provide resident access to dumpster areas for trash disposal.
- ☐ Dumpsters must be set on reinforced concrete pads.
- ☐ Provide fenced or screened trash barrel collection areas for each residential unit or unit group where dumpsters are not used.

MATERIALS

Dumpsters and trash receptacles are furnished by the LHA and should not be included in capital projects.

Provide fixed metal pipe bollards at rear of dumpster pad and at all impact points to protect enclosure from damage.

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SNOW REMOVAL

INVESTIGATION

Interview LHA to determine existing snow removal procedures, on-site retention/disposal areas and the type of equipment used. Discuss any improvements that may be incorporated into the design

Evaluate the LHA's deicing materials and practices

Conduct site analysis to identify area where winter icing is a problem.

DESIGN

Avoid potential plow obstructions (curb stops, speed bumps, parking lot peninsulas, traffic islands, etc.

Avoid circular or curved roadway configurations.

Use sloped granite curbing or Cape Cod berms where impact damage from snow plows is likely.

Design walkways and straight runs and adequate size for snow retention. Where possible, locate these areas at the ends of straight snow plow runs. Do not locate snow plow retention areas where accumulated snow will obstruct drainage structures or surface drainage channels.

DRYING YARDS

DESIGN

Drying yards are no longer utilized except when specifically requested by the LHA. Size and location vary according to demand.

If removal of drying yards is needed, remove all pavement and appurtenances to soil. Do not just cut off clothes line supports at grade.

Locate drying yards on level pavement within clear view of the buildings they are serving. Do not locate drying yards in unpaved areas.

Clothesline rails should be no higher than 6ft above grade and supported by posts set in concrete footings to frost depth. Locate posts no more than 12ft apart on center. Provide intermediate posts where rails are greater than 12ft in length.

Weld eyelets for clothesline to rail at 15in to 18in on center.

MATERIALS

Use galvanized steel pipe for posts and rails.

Clothesline is furnished by the LHA and should not be included in capital projects.

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RECREATIONAL FACILITIES

INVESTIGATION

Conduct a site and user analysis for potential locations of all recreational facilities being considered. The analysis should include, but not be limited to, target users, maintenance, lighting and security requirements, times of use, topographical and solar orientation, proximity to vehicular traffic, potential noise disruption to residents and neighbors, and possible hazards and liabilities.

REFERENCE STANDARDS

While each professional sports association has its own rules and regulations governing the layout, delineation and construction of their respective facilities, the standard design guidelines found in reference books such as *Timesaver Standards for Landscape Architecture* by Harris and Dines are sufficient for the level of performance required.

DESIGN

Recreational facilities at public housing sites are usually limited to basketball (full or half court) and handball courts, though other uses, such as softball, soccer, volleyball, shuffleboard, lawn bowling or bocce may be considered.

Hard surfaced playing courts should be level, drained side to side, end to end or corner to corner diagonally (full court), or front to end (half-court) at 1in per10ft.

Do not design any drains within the playing surface.

A north-south orientation of the long axis is preferred for most playing courts.

Basketball hoops should be mounted at a height of 10' 0" above the court surface.

Handball courts should allow an overhead clearance of 20ft.

MATERIALS

Playing courts (basketball and handball) may be paved with bituminous concrete and delineated with color coat or traffic paint.

Handball court walls should be concrete laid plumb to the playing surface.

Basketball hoops should be secured to metal poles set in concrete footings to frost level.

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PLAYGROUND EQUIPMENT

INVESTIGATION

Determine what age groups will be served and what activities and type of play will be encouraged.

Conduct site analysis to determine the location and extent of play area as well as the size and placement of play structures.

Research specific play structure manufacturers and equipment to determine use zones, fall zones, play sequences and safety requirements.

Include a playground design specialist on the design team.

Consider a proprietary specification for play structure to ensure adherence to specific design and performance criteria.

REFERENCE STANDARDS

Handbook for Public Safety, U.S. Consumer Product Safety Commission, Publication No. 325

ASTM F 1487-95 (Standard Consumer Safety Performance Specification for Playground Equipment for Public Use).

DESIGN

Play structures may be free standing or system-designed.

Locate play structures in central, visible, common-use areas away from roads and moving vehicles. Allow for maximum surveillance by residents.

Play structures should be age-appropriate for the following age groups:

- ☐ Infants (0 -1½ years)
- ☐ Toddlers (1½ - 3 years)
- ☐ Pre-school (3 - 5 years)
- ☐ Elementary (5 - 8 years)
- ☐ Pre-teen (8 – 12 years)

Play structures may be designed for the following combinations of age groups:

- ☐ Infant/pre-school (0 – 5 years)
- ☐ Toddler/pre-school (2 – 5 years)
- ☐ Older children (5 – 12 years)

Set support posts in concrete footings carried to frost depth.

Sill plates must rest on leveled subgrade, stone drainage course or resilient play surface.

All play surfaces must be handicap-accessible.

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PLAYGROUND EQUIPMENT, CON'T.

Provide curbing or other edge containment for play surface where it meets unpaved grade.

Paved surfaces must not encroach into the fall zones of play structures.

Provide seating for parents and adult supervisors.

Enclose play areas with a non-opaque fence 48in min in height provided with latchable gates.

MATERIALS

Do not install play equipment on hard or paved surfaces. Do not use wood bark mulch or wood chips. Play surfaces may be synthetic wood chip (fibar or equal), resilient rubberized material or a combination of both. All impact areas should receive rubberized impact blocks

Structural components of play structures should be fabricated from heavy steel tubing (11ga), steel pipe, channel, angle, plate and flat stock, galvanized and powder coated prior to installation.

Use composite plastic, cellulose-polymer material (Trex or equal) for platform planks, stair treads or other dimensional material.

Use tamper-proof stainless steel fasteners and hardware.

Minimize the use of plastic components. If needed plastic components shall be polyethylene with UV light inhibitor, fabricated according to manufacturer's specifications.

Do not use wood or treated wood on any play structure or equipment.

INSTALLATION

Play structures should be installed according to manufacturer's specifications, either by the site contractor or in a Community Build event initiated and organized by the LHA and supervised by the Playground Design Specialist.

Note: Some manufacturers require a certified installer.